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Towards the Standard Spherical Tiling

An isometric folding is a map that sends piecewise geodesic segments into piecewise geodesic segments of the same length. It is known, since 1989, that any non-trivial isometric folding of the euclidian plane is deformable into the standard planar folding $f : \mathbb{R}^2 \to \mathbb{R}^2$ defined by $f(x, y) = (x, |y|)$. However, the correspondent situation on the sphere remains an open question.

Related to spherical isometric foldings are spherical f-tilings, that is, edge to edge decompositions of the sphere by geodesic polygons, such that all vertices are of even valency and both sums of alternate angles, around any vertex, are π. The relation between these two sets of objects comes from the fact that the set of singularities of any non trivial isometric folding ia a spherical f-tiling.

As expected, the problem of isometric folding deformations gives rise to a similar problem on spherical f-tiling deformations. More precisely, is any spherical f-tiling deformable into the standard tiling (f-tiling whose underline graph is a great circle)?

Here, we provide a way to deforme into the standard f-tiling, each one of the dihedral f-tilings of the sphere whose prototiles are two non congruent isosceles spherical triangles in a particular way of adjacency.

This is a joint work with Professor Ana Breda.